Chapter 10
Suspension and steering systems

Contents

	Section
Balljoints - check and replacement	4
Coil spring (2WD models) - removal and installation	6
Front end alignment - general information	22
Front wheel bearing check, repack and adjustment (2WD models only)	See Chapter 1
General information	1
Hub and bearing assembly (4WD models) - replacement	9
Leaf spring/shackle - removal and installation	13
Lower control arm - removal and installation	8
Power steering fluid level check	See Chapter 1
Power steering pump - removal and installation	19
Power steering system - bleeding	20
Shock absorber (front) - removal and installation	2
Shock absorber (rear) - removal and installation	12
Stabilizer bar (front) - removal and installation	3
Stabilizer bar (rear) - removal and installation	14
Steering gear - removal and installation	18
Steering knuckle (2WD models) - removal and installation	5
Steering knuckle (4WD models) - removal and installation	10
Steering linkage - inspection, removal and installation	17
Steering wheel - removal and installation	16
Suspension and steering check	See Chapter 1
Tire and tire pressure checks	See Chapter 1
Tire rotation	See Chapter 1
Torsion bar (4WD models) - removal and installation	11
Track bar (ZR2 models) - removal and installation	15
Upper control arm - removal and installation	7
Wheels and tires - general information	21

Specifications

Torque specifications

	Ft-lbs (unless otherwise indicated)
Front suspension	
2WD models	
Balljoints	
Lower balljoint-to-knuckle nut	
1994	70
1995 on	79
Upper balljoint-to-knuckle nut	
1994	70
1995 on	61
Lower control arm-to-frame bolts	
1994	70
1995 on	
Front bolt	85
Rear bolt	72
Shock absorber	
Lower bolt	
1994 and 1995	20
1996 on	22
Upper nut	
1994 and 1995	132 in-lbs
1996 on	106 in-lbs
Stabilizer bar	
Clamp-to-frame bolts	
1994	24
1995 on	26
Link nut	150 in-lbs
Upper control arm	
Control arm-to-frame nuts	
1994 and 1995	65
1996 on	55
Control arm shaft nuts	85
4WD models	
Balljoints	
Lower balljoint	79
Upper balljoint	61
Hub and bearing assembly bolts	77
Lower control arm	81
Shock absorber upper and lower nuts	54

Torque specifications (continued)

Ft-lbs (unless otherwise indicated)

Front suspension

4WD models

Stabilizer bar	
Clamp-to-frame bolts	
1994 and 1995	30
1996 on	48
Link nut-to-lower control arm	
1994 and 1995	123 in-lbs
1996 on	132 in-lbs
Tie-rod-to-steering knuckle nut	
1994	35
1995 on	39
Torsion bar	
Lower link nut	37
Upper link nut	48
Upper control arm	84

Rear suspension

Leaf spring	
Leaf spring-to-front bracket nuts	89
Shackle-to-frame nuts	89
Shackle-to-spring nuts	89
U-bolt nuts	73
Shock absorber	
Lower nut	
1994 and 1995	73
1996 on	
Two-door and truck	62
Four-door	74
Upper nut	22
Stabilizer bar	
Clamp U-bolt nuts	44
Stabilizer bar link	
Upper link nut	
Two-door and truck	25
Four-door	50
Lower link nut	
Two-door and truck	50
Four-door	42
Track bar (ZR2 models)	
Axle bracket nuts	
Through 1998	84
1999 and later	45
Frame bracket nut	44

Steering

Idler arm	
Idler arm-to-frame	
1994 and 1995	60
1996 on	79
Idler arm-to-relay rod	
2WD	35
4WD	60
Intermediate shaft-to-steering shaft pinch bolt	26
Pitman arm	
Pitman arm-to-steering gear nut	185
Pitman arm-to-relay rod	
2WD	35
4WD	60
Power steering hose clamps	17 in-lbs
Power steering line fittings	21
Steering damper	
Steering damper-to-front crossmember	
1994 and 1995	26
1996 on	44
Steering damper-to-relay rod	
1994 and 1995	45
1996 on	46
Steering gear-to-frame bolts	55

Steering wheel nut	
1994	17
1995 on	30
Tie-rods	
Tie-rod-to-relay rod	35
Adjuster tube clamp bolts	
1994 and 1995	168 in-lbs
1996 on	192 in-lbs

1 General information

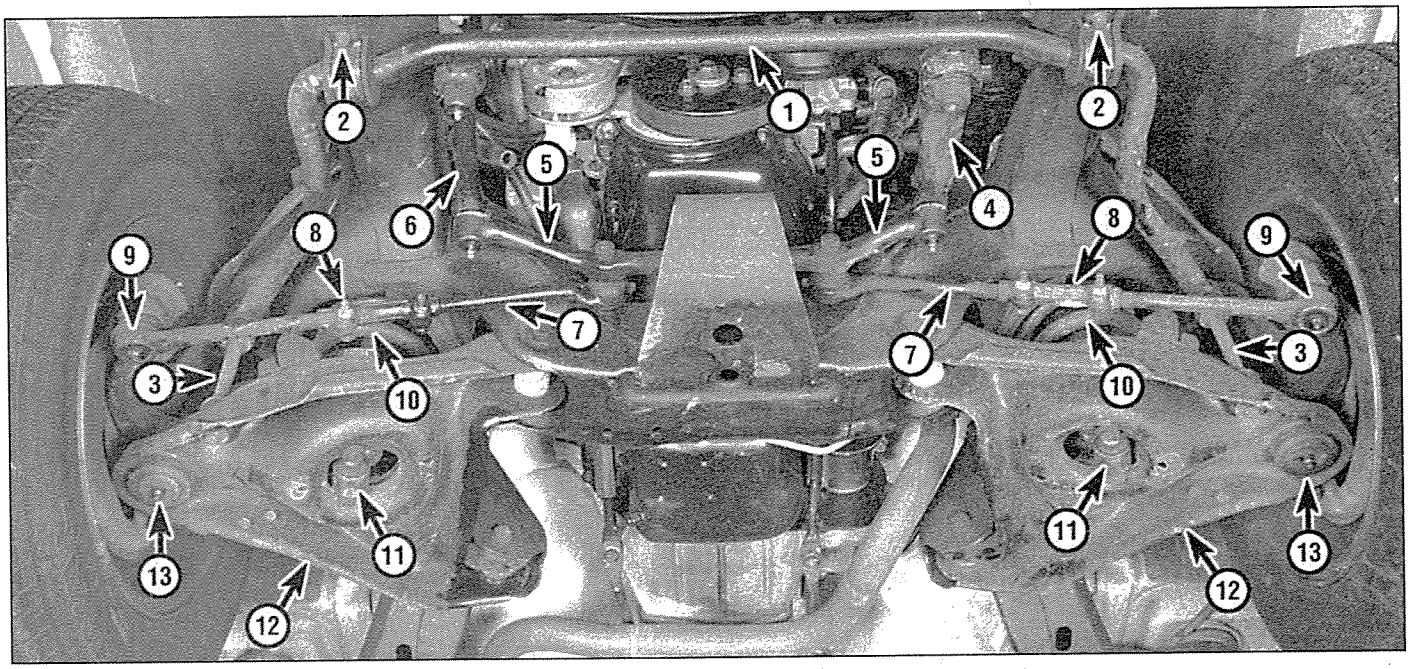
Refer to illustrations 1.1a, 1.1b and 1.3

The front suspension **(see illustrations)** is fully independent. Each wheel is connected to the frame by a steering knuckle, upper and lower balljoints and upper and lower control arms. Coil springs and shock absorbers are used on 2WD models; 4WD models use shocks and torsion bars. The coil springs are mounted between the spring pockets on the frame and the lower control arms. The shocks are attached to the lower control arms by bolts and nuts; the upper end of each shock is attached to a bracket on the frame. A stabilizer bar, bolted to the frame and to the two lower control arms, reduces vehicle roll during cornering.

The steering linkage consists of a Pitman arm, idler arm, relay rod, two adjustable tie-rod assemblies (each consisting of an inner tie-rod, adjuster tube and outer tie-rod) and, on 4WD and ZR2 models, a steering damper. When the steering wheel is turned, the gear rotates the Pitman arm which forces the relay rod to one side. The tie-rods, which are connected to the relay rod by ball studs, transfer steering force to the wheels. The tie-rods are adjustable and are used for toe-in adjustments. The relay rod is supported by the Pitman arm and idler arm. The idler arm pivots on a support attached to a frame rail. The steering damper, if equipped, is attached to a bracket on the frame and to the relay rod.

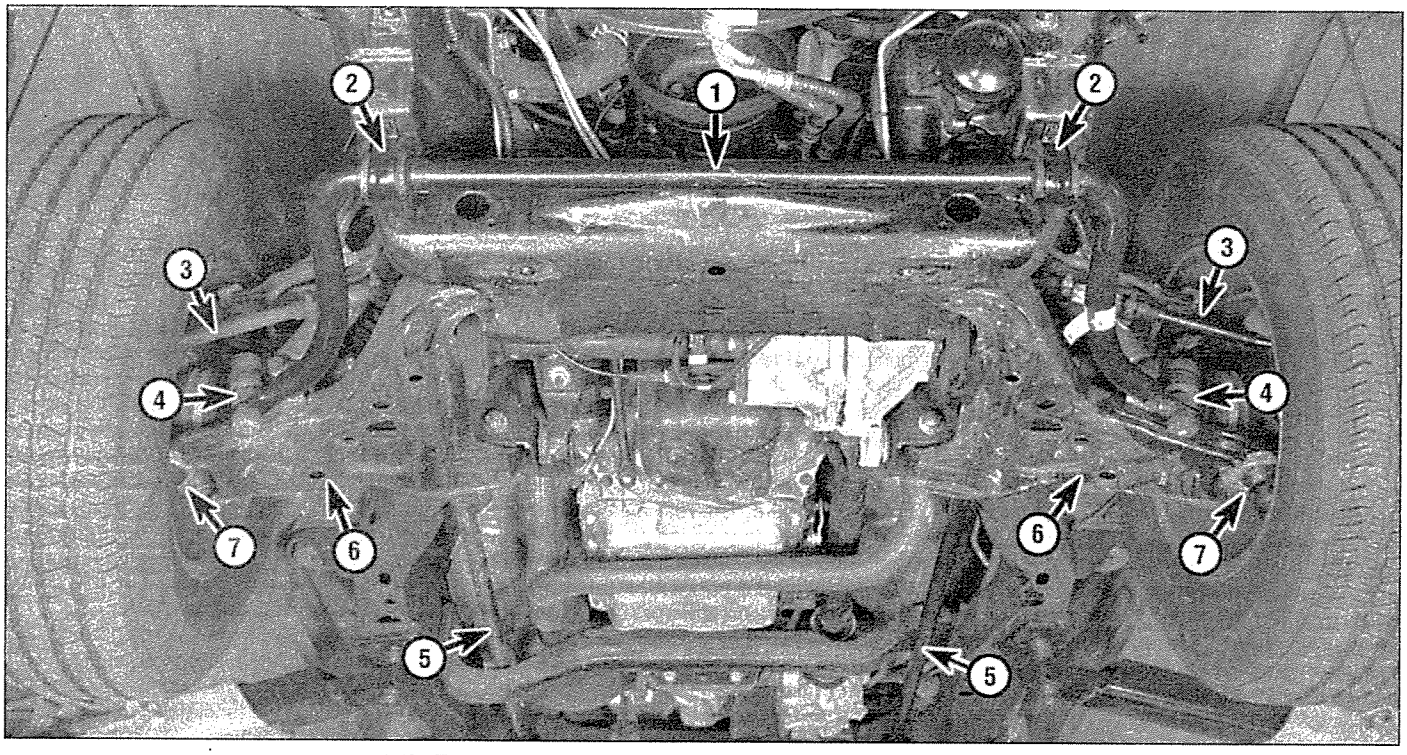
The rear suspension **(see illustration)** consists of a pair of multi-leaf springs and two shock absorbers. The rear axle assembly is attached to the leaf springs by U-bolts. The front ends of the springs are attached to the frame at the front hangers, through rubber bushings. The rear ends of the springs are attached to the frame by shackles which allow the springs to alter their length when the vehicle is in operation. Some models also use a stabilizer bar, bolted to the frame and the axle, to reduce vehicle roll during cornering. ZR2 models are equipped with a track bar bolted to the left end of the rear axle and, at its opposite end, to a bracket on the right frame rail.

Frequently, when working on the suspension or steering system components, you may come across fasteners which seem impossible to loosen. These fasteners on the underside of the vehicle are continually subjected to water, road grime, mud, etc., and can become rusted or "frozen," making them extremely difficult to remove. In order to unscrew these stubborn fasteners without damaging them (or other components), be sure to use lots of penetrating oil and allow it to soak in for a while. Using a wire brush to clean exposed threads will also ease removal of the nut or bolt and prevent damage to the threads. Sometimes a sharp blow with a hammer and punch is effective in breaking the bond between a nut and bolt threads, but care must be taken to prevent the punch from slipping off the fastener and ruining the threads. Heating the stuck fastener and surrounding area with a torch sometimes helps too, but isn't recommended because of the obvious dangers associated with fire. Long breaker bars and extension, or "cheater," pipes will increase leverage, but never use an extension pipe on a ratchet - the ratcheting mechanism could be damaged. Sometimes, turning the nut or bolt in the tightening (clockwise) direction first will help to break it loose. Fasteners that require drastic measures to unscrew should always be replaced with new ones.



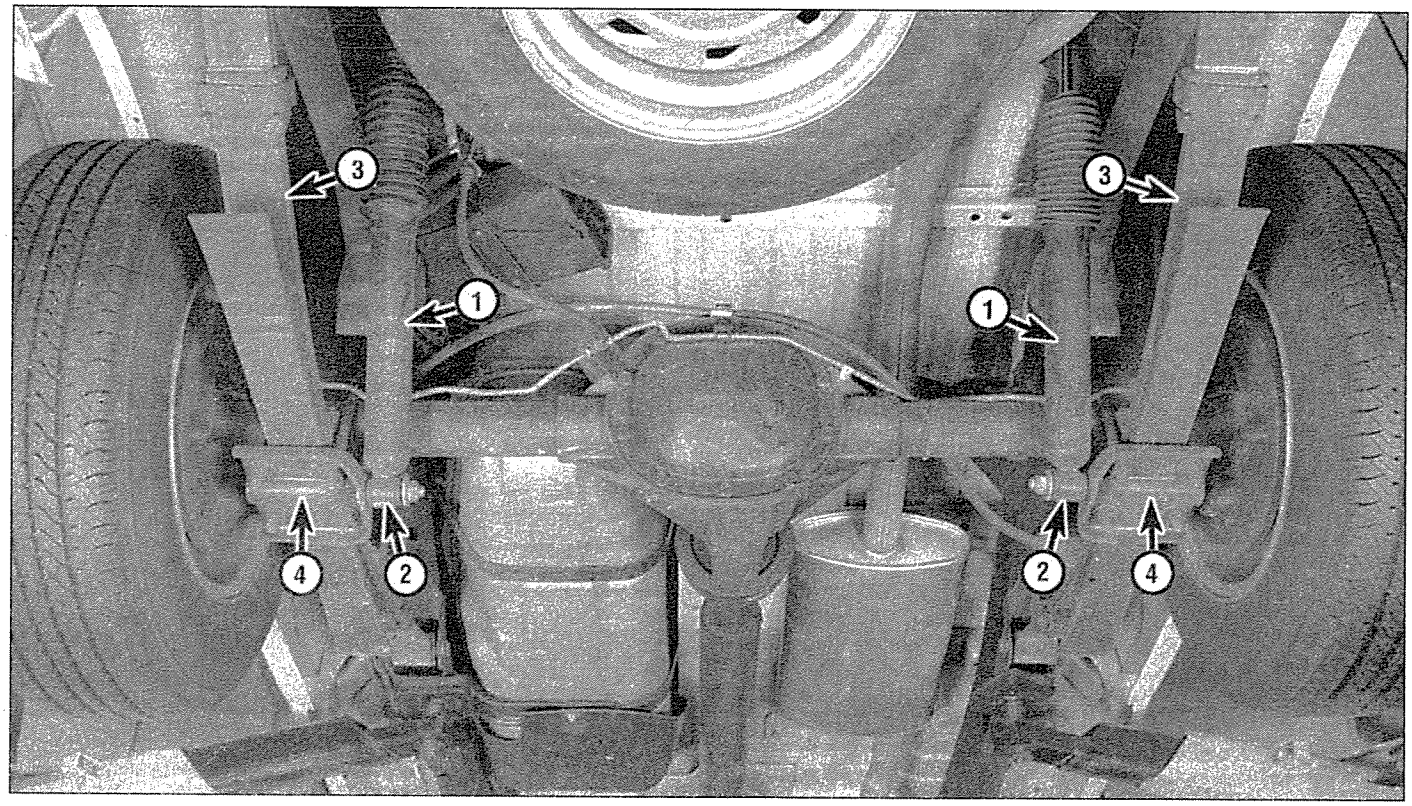
1.1a Front suspension and steering components (2WD models)

1 *Stabilizer bar*
2 *Stabilizer bar mounting clamps*
3 *Stabilizer bar-to-control arm links*
4 *Pitman arm*
5 *Relay rod*
6 *Idler arm*
7 *Inner tie-rods*
8 *Tie-rod adjuster tubes*
9 *Outer tie-rods*
10 *Coil springs*
11 *Shock absorber*
12 *Lower control arm*
13 *Lower control arm balljoint*



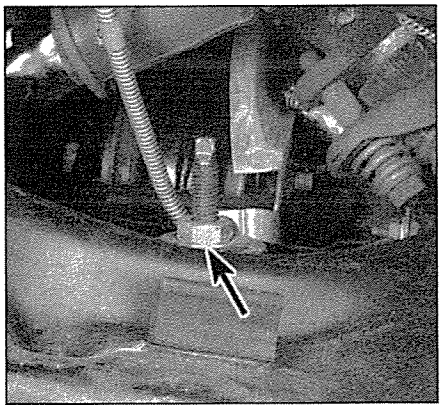
1.1b Front suspension and steering components (4WD models)

1 *Stabilizer bar*
2 *Stabilizer bar clamps*
3 *Outer tie-rod*
4 *Stabilizer bar links*
5 *Torsion bars*
6 *Lower control arms*
7 *Lower control arm balljoints*



1.3 Rear suspension components

1 *Shock absorbers*
2 *Lower shock absorber mount*
3 *Multi-leaf spring assemblies*
4 *Leaf spring anchor plates*



2.1 To detach the upper end of the shock absorber from the frame bracket, remove this nut (arrow), the retainer (large metal washer) and the grommet (large rubber washer)

Since most of the procedures that are dealt with in this Chapter involve jacking up the vehicle and working underneath it, a good pair of jackstands will be needed. A hydraulic floor jack is the preferred type of jack to lift the vehicle, and it can also be used to support certain components during various operations. **Warning:** *Never, under any circumstances, rely on a jack to support the vehicle while working on it. Also, whenever any of the suspension or steering fasteners are loosened or removed they must be inspected and, if necessary, replaced with new ones of the same part number or of original equipment quality and design. Torque specifications must be followed for proper reassembly and component retention. Never attempt to heat or straighten suspension or steering components. Instead, replace bent or damaged parts with new ones.*

2 Shock absorber (front) - removal and installation

2WD models

Refer to illustrations 2.1 and 2.4

1 Using a backup wrench on the stem, remove the upper shock mounting nut **(see illustration)**.

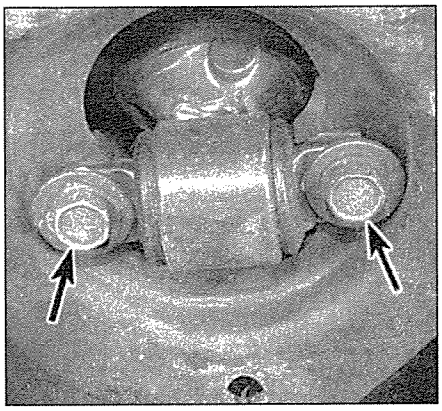
2 Remove the retainer (metal washer) and grommet (rubber washer).

3 Raise the vehicle and support it securely on jackstands.

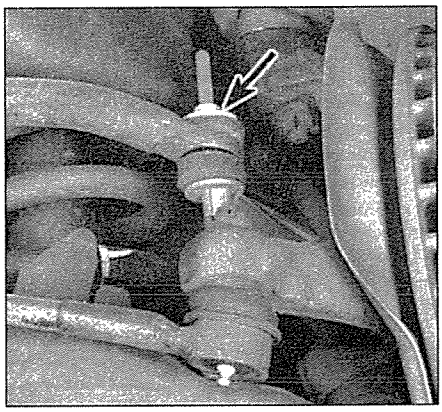
4 Working from underneath the vehicle, remove the two bolts which attach the lower end of the shock absorber to the lower control arm **(see illustration)** and pull the shock out from below.

5 Remove the lower grommet and retainer from the stem.

6 Installation is the reverse of removal. Be sure to tighten the upper mounting nut and the lower mounting bolts to the torque listed in this Chapter's Specifications.



2.4 To detach the lower end of the shock absorber from the lower control arm on a 2WD model, remove these two bolts (arrows)



3.2a To disconnect the stabilizer bar from the link bolt on 2WD models, remove this nut (arrow); be sure to keep all the retainers (washers), grommets and spacers in order when you pull out the link bolt

4WD models

Refer to illustration 2.8

7 Raise the vehicle and support it securely on jackstands.

8 Remove the lower shock mounting nut, washer and bolt **(see illustration)**. Note the direction in which the bolt points.

9 Collapse the shock absorber.

10 Remove the upper shock mounting nut, washer and bolt. Again, note the direction in which the bolt points.

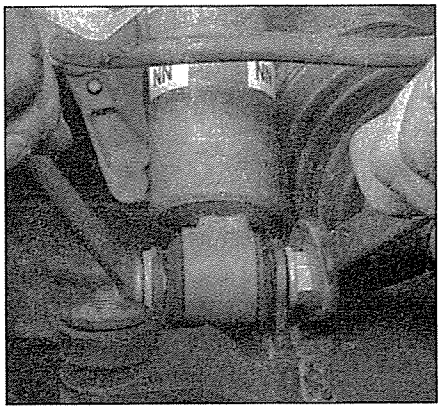
11 Remove the shock absorber.

12 Installation is the reverse of removal. Be sure to install the bolts so that they're pointing in the same direction as they were prior to removal. Tighten all fasteners to the torque listed in this Chapter's Specifications.

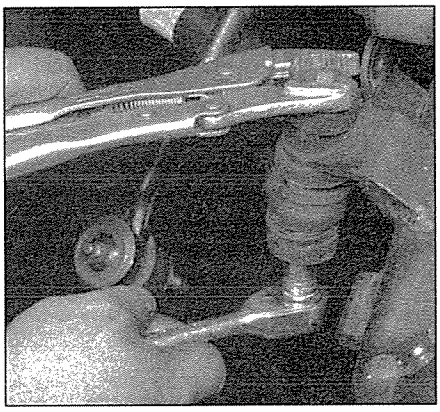
3 Stabilizer bar (front) - removal and installation

Refer to illustrations 3.2a, 3.2b and 3.3

1 Raise the vehicle and support it securely on jackstands.



2.8 To detach the lower end of the shock absorber from the lower control arm on 4WD models, remove this nut and bolt

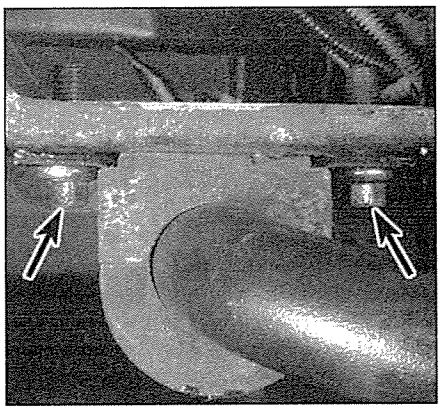


3.2b To disconnect the stabilizer bar from the lower control arm on 4WD models, hold the link bolt nut with a pair of locking pliers and break the link bolt loose

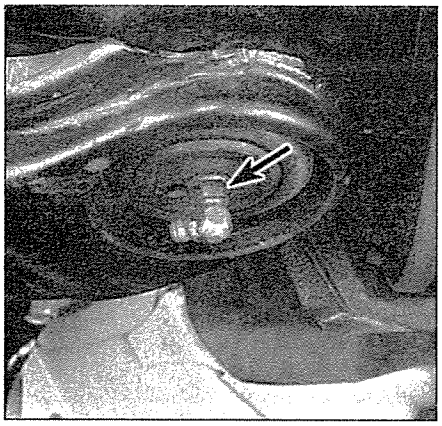
2 Remove the nuts from the link bolts and remove the link bolts **(see illustrations)**. **Note:** *Be sure to keep the parts for the left and right sides separate.*

3 Remove the stabilizer bar bracket bolts **(see illustration)**.

4 Remove the stabilizer bar.



3.3 To separate the stabilizer bar from the frame, remove the bushing clamp bolts (arrows) from both frame rails (left clamp shown, right clamp identical)



4.5 On 2WD models, it's easy to check the lower control arm balljoint for wear: The shoulder (arrow) for the grease fitting protrudes 0.050-inch from the surface of the cover. As the balljoint wears, this shoulder moves up into the balljoint assembly; if the shoulder is flush with the cover, or is up inside the hole, replace the balljoint

5 Remove the rubber bushings.
6 Inspect all parts for wear and damage.
7 When you install the rubber bushings on the stabilizer bar, be sure to position them so the slits face toward the front of the vehicle.
8 Installation is otherwise the reverse of removal. Be sure to tighten all fasteners to the torque listed in this Chapter's Specifications.

4 Balljoints - check and replacement

Check

1 Inspect the control arm balljoints for looseness anytime either of them is separated from the steering knuckle. See if you can turn the ballstud in its socket with your fingers. If the balljoint is loose, or if the ballstud can be turned, replace the balljoint. You can also check the balljoints with the suspension assembled as follows.
2 Loosen the wheel lug nuts, raise the front of the vehicle and support it securely on jackstands. Remove the wheel.
3 Place jack stands under the lower control arms. Position the stands as close to each balljoint as possible. Make sure the vehicle is stable. It should not rock on the stands.

Lower balljoints

Refer to illustration 4.5

4 Wipe each balljoint clean and inspect the seal for cuts and tears. If the seal is damaged, replace the balljoint.
5 The lower balljoints on 2WD models employ a visual wear indicator **(see illustration)** that allows easy diagnosis. The shoulder at the base of the grease nipple protrudes about 0.050-inch from the lower surface of the balljoint's lower cover when the balljoint is new. As the balljoint wears, this shoulder slowly moves up into the balljoint. If the shoulder is flush with or inside the surface of the lower cover, replace the lower balljoint.
6 To check the lower balljoint on 4WD models, position a dial indicator against the wheel rim and insert a prybar between the lower control arm and the steering knuckle. As you lever the prybar, the needle should not deflect more than 0.125-inch. If it does, replace the lower balljoint.

Upper balljoints

7 Position a dial indicator against the wheel rim, grasp the top and bottom of the tire and "rock" the tire, alternately pushing the top and pulling the bottom, and vice versa. The dial indicator should indicate no more than 0.125-inch deflection. If the indicated reading exceeds this figure, replace the upper balljoint.

Replacement

2WD models (upper balljoint)

Refer to illustration 4.11

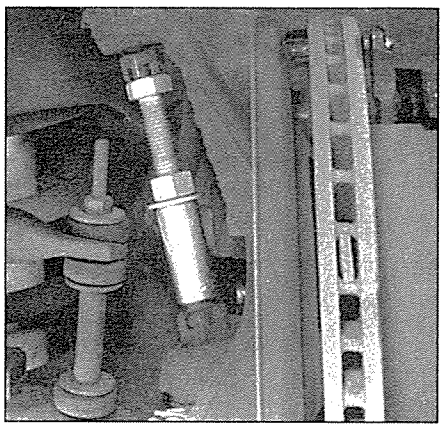
8 Raise the vehicle, support it securely on jackstands and remove the front wheel, if you haven't already done so. Remove the brake caliper and hang it out of the way with a piece of wire (see Chapter 9). Disconnect the ABS wheel speed sensor and remove the wiring from the upper control arm (see Section 9).
9 Remove the cotter pin from the balljoint and back off the nut two turns.
10 Place a jack or jackstand under the lower control arm and slightly compress the spring. **Note:** *The jack or jackstand must remain under the control arm during removal and installation of the balljoint to hold the spring and control arm in position.*
11 Separate the balljoint from the steering knuckle using a special tool or a balljoint separator to press the balljoint out of the steering knuckle **(see illustration). Note:** *The use of a "picklefork" type balljoint separator may tear the balljoint boot.*
12 To remove the upper balljoint from the upper control arm, drill out the four rivets from the top of the balljoint, remove the balljoint and clean the control arm. Install the new upper balljoint against the mating surface of the control arm and secure it with the nuts and bolts (the nuts and bolts are normally supplied with the new balljoint). Tighten the nuts and bolts to the torque specified in the balljoint replacement kit instructions.

2WD models (lower balljoint)

13 Remove the lower control arm (see Section 8) and take it to an automotive machine shop to have the balljoint pressed out and a new one pressed in.

2WD models (upper or lower balljoint)

14 Inspect the tapered holes in the steering knuckle, removing any accumulated dirt. If out-of-roundness, deformation or other damage is noted, the knuckle must be replaced with a new one (see Section 5).

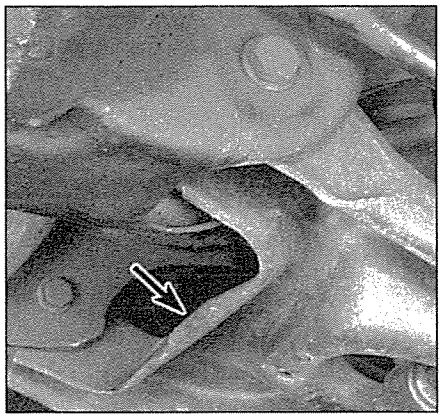


4.11 On 2WD models, the best way to separate the upper and/or lower balljoint studs from the steering knuckle is with a special tool; however, you can fabricate a similar tool from a large bolt, nut, washer and socket, as shown

15 Reconnect the balljoints to the steering knuckle and tighten the nuts to the torque listed in this Chapter's Specifications.
16 If the cotter key does not line up with the opening in the castellated nut, tighten (never loosen) the nut just enough to allow installation of the cotter pin.
17 Install the grease fittings and lubricate the new balljoints (Chapter 1).
18 Install the wheels and lower the vehicle.
19 The front end alignment should be checked by a dealer service department or alignment shop.

4WD models

20 The procedure for replacing an upper balljoint on a 4WD model is similar to that described above for 2WD models, except that a picklefork-type balljoint separator is usually necessary for separating the balljoint stud from the steering knuckle. The procedure for replacing a lower balljoint follows.
21 Raise the vehicle and support it securely on jackstands.
22 Remove the wheel.
23 Remove the front splash shield bolts. Pivot the shield out of the way to gain access to the tie-rod end.
24 Disconnect the tie-rod from the relay rod (see Section 17).
25 Remove the driveaxle (see Chapter 8).
26 Center punch the bottom of each rivet.
27 Using a 1/8-inch drill bit, drill a guide hole 1/2-inch deep into the rivet heads.
28 Using a 5/16-inch drill bit, drill the rivet heads off. Drill a hole two-thirds the length of the rivet shank, using the same drill.
29 Knock the rivets out with a hammer and punch.
30 Remove the balljoint stud cotter pin.
31 Support the lower control arm with floor jack.
32 Loosen the balljoint nut a couple of turns.



6.5 Position a floor jack under the inner edge of the control arm (arrow)

33 Back off the torsion bar adjusting arm bolt to reduce the tension on the bar (see Section 11). Don't remove the bolt completely.
34 Separate the knuckle from the balljoint with a two-jaw puller or a "picklefork."
35 Remove the nut and separate the balljoint from the lower control arm.
36 Install the new balljoint to the control arm. Install the nuts and bolts and tighten them to the torque specified in the balljoint replacement kit.
37 Raise the lower control arm with a floor jack and insert the balljoint stud into the steering knuckle. Lower the jack until the balljoint stud seats in the hole, then install the nut and tighten it to the torque listed in this Chapter's Specifications. Install a new cotter pin and bend the ends of the pin against the nut.
38 Load the torsion bar (see Section 11).
39 Install the driveaxle assembly (see Chapter 8).
40 Connect the inner tie-rod end to the relay rod, install the tie-rod end nut and tighten it to the torque listed in this Chapter's Specifications.
41 Install the front splash shield and tighten the splash shield bolts securely.
42 Install the wheel and lug nuts.
43 Lower the vehicle.
44 Tighten the wheel lug nuts to the torque listed in the Chapter 1 Specifications.

5 Steering knuckle (2WD models) - removal and installation

1 Raise the front of the vehicle and support it securely on jackstands. Apply the parking brake.
2 Support the lower control arm with a jack so the coil spring is compressed to its normal ride height. **Warning:** *The jack must remain in this position throughout the entire procedure.*
3 Remove the wheel. Disconnect the ABS wheel speed sensor (see Section 9).
4 Remove the brake caliper (see Chapter 9) and the brake disc/hub assembly (see Chapter 1, *Front wheel bearing check, repack and adjustment*).
5 Remove the disc splash shield, if equipped.
6 Disconnect the tie-rod end from the knuckle (see Section 17).
7 Disconnect the balljoints from the steering knuckle (see Section 4).
8 Remove the steering knuckle.
9 Installation is the reverse of removal. Adjust the front wheel bearings (see Chapter 1) and have the front wheel alignment checked by a dealer service department or alignment shop.

6 Coil spring (2WD models) - removal and installation

Removal

Refer to illustration 6.5
1 Loosen the wheel lug nuts, raise the vehicle and support it securely on jackstands.
2 Remove the shock absorber (see Section 2).
3 Disconnect the stabilizer bar from the lower control arm (see Section 3).
4 Loop a length of chain up through the control arm and coil spring and bolt the chain together. Make sure there's enough slack in the chain so it won't inhibit spring extension when the control arm is lowered.
5 Position a floor jack under the inner edge of the lower control arm **(see illustration)**. **Warning:** *Failure to support the lower control arm could result in severe injury.*
6 Raise the jack slightly to relieve spring pressure from the control arm pivot bolts. Remove the rear bolt first, then the front. If they're difficult to remove, tap them out with a hammer and a long, narrow punch.
7 Slowly lower the jack until the coil spring is fully extended.
8 Check that all tension has been removed from the spring, then unbolt the safety chain and maneuver the coil spring out. Do not apply downward pressure on the control arm, as it may damage the balljoint. If the upper insulator isn't on the top of the spring, reach up into the spring pocket and retrieve it.

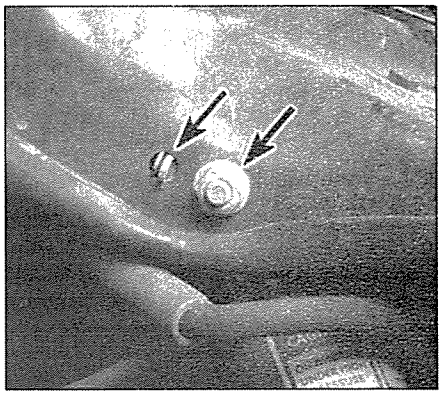
Installation

9 Place the insulator on top of the coil spring (the top of the spring is flat on the end, with a gripper notch near the end of the spring coil).
10 Install the top of the spring into the spring pocket and the bottom in the lower control arm. The piece of tape on the coil spring must be towards the bottom. The end of the lower coil must cover all of one drain hole, while the other drain hole must remain unobstructed.
11 Raise the lower control arm until the bolt holes are aligned, then install the pivot bolts. The bolts must be inserted from the front. Install the nuts, but don't tighten them completely at this time.
12 Install the shock absorber.
13 Connect the stabilizer bar to the lower control arm.
14 Install the wheel and lug nuts. Lower the vehicle and tighten the lug nuts to the torque specified in Chapter 1.
15 Reach under the vehicle and tighten the pivot bolt nuts to the torque listed in this Chapter's Specifications.

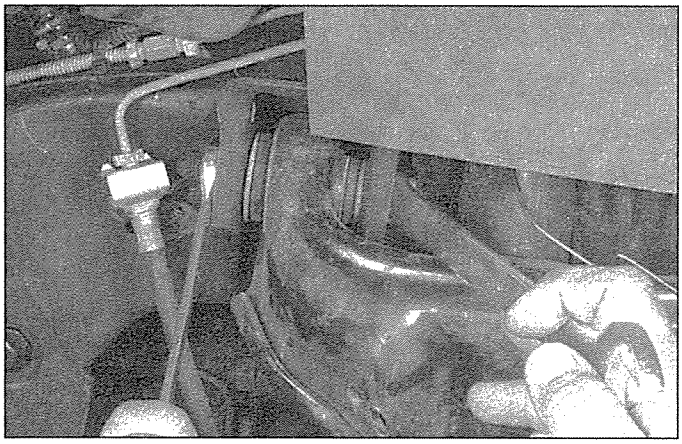
7 Upper control arm - removal and installation

Removal

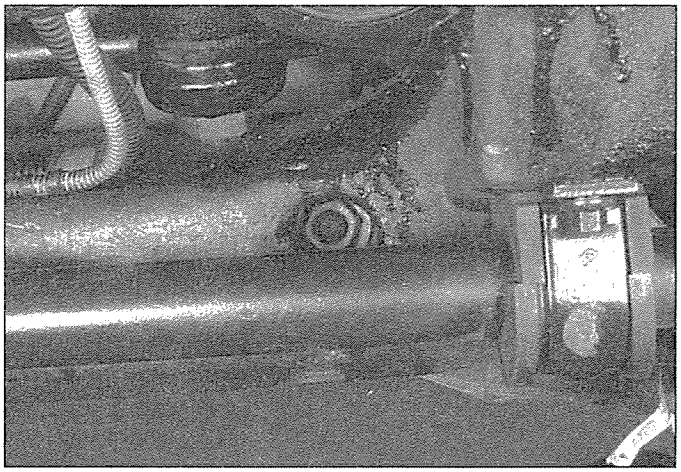
Refer to illustration 7.4 and 7.6
Note: *This procedure applies to both 2WD and 4WD models.*
1 Loosen the wheel lug nuts, raise the front of the vehicle and support it securely on jackstands. Apply the parking brake. Remove the wheel.
2 Position a floor jack, with a wood block on the jack head (to act as a cushion), under the lower control arm in the area between the spring seat and the balljoint. Raise the jack slightly to take the spring pressure off the upper control arm. **Warning:** *The jack must remain in this position throughout the entire procedure.*
3 Remove the air cleaner extension, if necessary.
4 Disconnect the brake hose bracket from the upper control arm **(see illustration)**. Disconnect the ABS wheel speed sensor and remove the wiring from the upper control arm (see Section 9).
5 Disconnect the upper balljoint from the steering knuckle (see Section 4).
6 On 2WD models, note the location of number of shims on the upper control arm pivot shaft, then remove the pivot shaft nuts, bolts and shims. On 4WD models, mark the positions of the adjuster cams to the frame so they can be returned to the same settings



7.4 Before removing the upper control arm, make sure you detach the brake hose bracket (left arrow points to the bracket tang protruding through arm) by removing this nut (right arrow)



7.6 When removing the upper control arm on a 4WD model, make sure you mark the relationship of the eccentric cams to the frame bracket before removing the front and rear pivot nuts and bolts



8.11a The nut for the 4WD lower control arm's front pivot bolt is located inside this hole in the lower crossmember

when the arm is installed. Remove the upper control arm pivot bolts and nuts **(see illustration)**. Remove the control arm.

7 Inspect the pivot bolt bushings for wear. Replace them if necessary. **Note:** *The bushings on some models are welded in place and can't be removed. If they're worn, you'll have to replace the control arm. On other models, a hydraulic press may be required to accomplish removal and installation of the bushings, in which case you'll have to take the control arm to a dealer service department or other repair shop to have this done for you.*

Installation

8 Position the arm in the frame brackets and install the bolts and nuts. They must be installed with their heads towards the inside, facing each other. Don't tighten the nuts completely at this time. If an alignment kit has been installed, line up the previously applied matchmarks.

9 Attach the balljoint to the steering knuckle (see Section 4).

10 Connect the brake hose bracket to the upper control arm.

11 Install the wheel and lug nuts, then lower the vehicle. Tighten the lug nuts to the torque listed in the Chapter 1 Specifications.

12 Tighten the pivot bolt nuts to the torque listed in this Chapter's Specifications.

13 Install the air cleaner extension, if it was removed.

8 Lower control arm - removal and installation

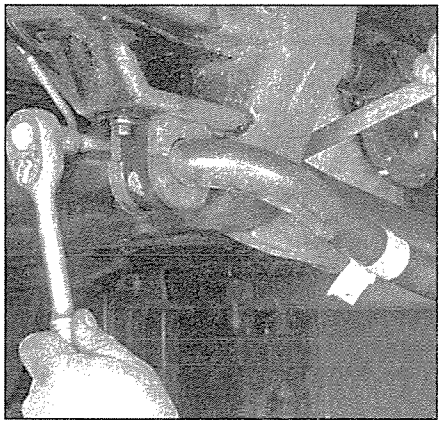
2WD models

Removal

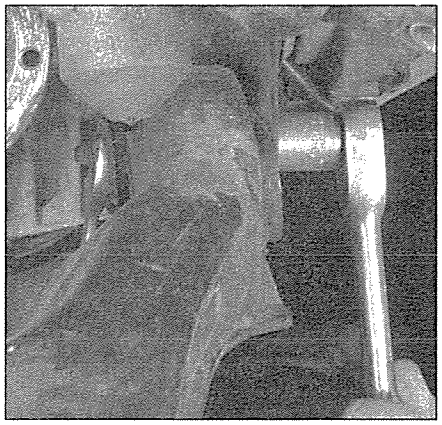
1 Loosen the wheel lug nuts, raise the vehicle and support it securely on jackstands. Remove the wheel.

2 Remove the coil spring (see Section 6).

3 Disconnect the lower balljoint (see Section 4).



8.11b Using a backup wrench on the front pivot bolt, break the nut loose with a deep socket



8.11c Using a backup socket on the rear pivot bolt, break the nut loose with a wrench

4 Take the control arm to a dealer or properly equipped shop to have the balljoint and bushings replaced, if necessary.

Installation

5 Installation is the reverse of removal. Don't tighten the pivot shaft nuts or bolts until the vehicle is at normal ride height, then tighten all fasteners to the torque listed in this Chapter's Specifications.

4WD models

Removal

Refer to illustrations 8.11a, 8.11b and 8.11c

6 Loosen the wheel lug nuts, raise the vehicle and support it securely on jackstands. Remove the wheel.

7 Remove the front splash shield, if equipped, for access to the front end components.

8 Disconnect the shock absorber from the lower control arm (see Section 2).

9 Disconnect the stabilizer bar from the lower control arm (Section 3).

10 Remove the torsion bar (see Section 11).

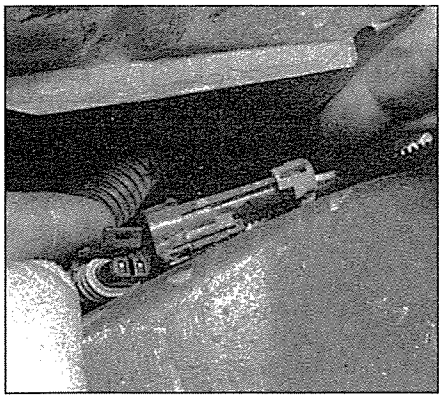
11 Remove the lower control arm pivot bolts, nuts and washers **(see illustrations)**. Remove the lower control arm. Detach the lower balljoint from the steering knuckle (see Section 4).

12 Check the bushings for damage or wear. Some models have welded-in bushings that can't be replaced. If this is the case, replace the control arm. Other models have replaceable bushings, but a press and special adapters are required to remove and install them. Take the control arm to a dealer service department or other repair shop to have the bushings replaced for you.

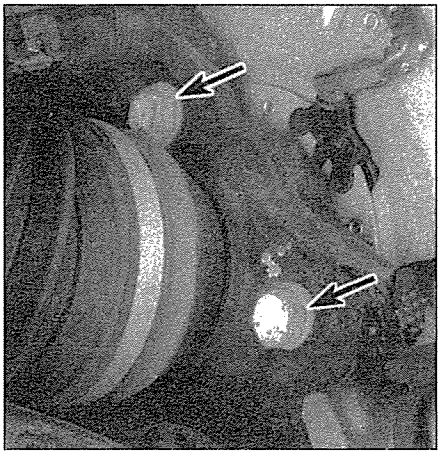
Installation

13 Raise the control arm into position and install the control arm pivot bolts, washers and nuts, but don't tighten them completely at this time. Make sure the threaded portions of both bolts are facing forward, i.e. the nuts should be at the front.

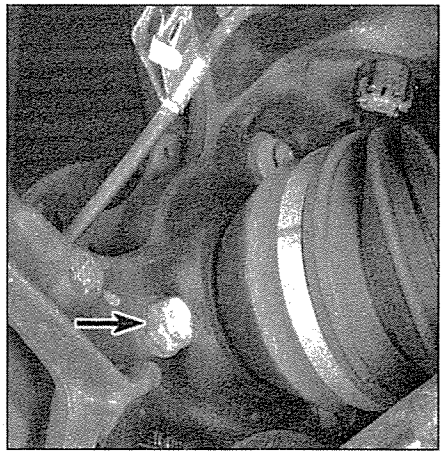
14 Carefully raise the lower control arm with the floor jack until the balljoint stud can be inserted into the hole in the steering knuckle. Install the balljoint stud nut, tighten it to the torque listed in this Chapter's Specifi-



9.4 Locate the electrical connector for the wheel speed sensor on top of the frame rail and unplug it to protect the lead from damage when the hub and bearing assembly is removed from the steering knuckle



9.5a To detach the hub and bearing assembly from the steering knuckle, remove these bolts (arrows) . . .



9.5b . . . and this bolt (arrow) (upper bolt is the same upper bolt shown in the previous photo)

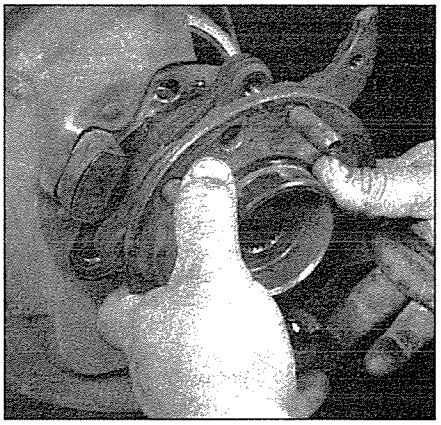
cations, then install a new cotter pin.
15 Install the torsion bar (see Section 11).
16 Connect the stabilizer bar to the lower control arm (see Section 3).
17 Install the shock absorber (see Section 2).
18 Install the wheel and lug nuts. Lower the vehicle and tighten the lug nuts to the torque listed in the Chapter 1 Specifications.
19 Tighten the lower control arm pivot bolts to the torque listed in this Chapter's Specifications.
20 Install the splash shield, if equipped.
21 Measure the vehicle's ride height on each side, from equal points on the frame to the ground. If the side that has been worked on is higher or lower than the other side, turn the torsion bar adjusting screw accordingly until the vehicle sits level. This may take a few tries, and it's important to roll the vehicle back and forth and jounce the front end between adjustments, to settle the suspension and get an accurate reading.

9 Hub and bearing assembly (4WD models) - replacement

Refer to illustrations 9.4, 9.5a, 9.5b and 9.6

Note: *The hub and bearing assembly is a sealed unit and isn't serviceable. If it's defective, it must be replaced.*

1 Put the vehicle in gear, apply the parking brake and break loose the driveaxle/hub nut with a socket and large breaker bar.
2 Loosen the wheel lug nuts, raise the vehicle and support it securely on jackstands. Remove the wheel. Remove the driveaxle/hub nut.
3 Unbolt the brake caliper and hang it out of the way with a piece of wire (see Chapter 9). Remove the brake disc.
4 On models with four-wheel ABS, trace the electrical lead for the wheel speed sensor along the upper control arm, then forward along the frame rail and unplug the electrical connector **(see illustration)**. (When the hub and bearing assembly is removed, the brake disc shield is no longer attached and might fall off the steering knuckle; the wheel speed sensor is attached to this shield, so unplugging the connector protects the lead in the event the shield falls.)
5 Remove the hub assembly-to-steering knuckle bolts **(see illustrations)**. Remove the brake disc shield and wheel speed sensor assembly and set it aside.
6 Tap the hub assembly from side-to-side to break it loose from the steering knuckle. Pull the hub assembly off the end of the driveaxle **(see illustration).** Wrap the end of the driveaxle with a rag to prevent damaging it. If the hub is stuck on the splines on the end of the driveaxle, use a puller to free it.
7 Installation is the reverse of the removal procedure. Be sure to lubricate the driveaxle splines with multi-purpose grease, and tighten all of the fasteners to the torque listed in this Chapter's Specifications.



9.6 Remove the hub and bearing assembly from the steering knuckle, then remove the brake disc shield and set it aside

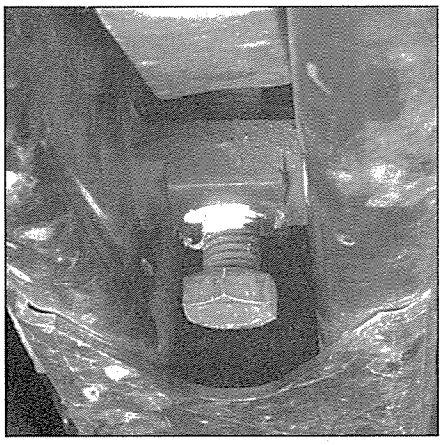
10 Steering knuckle (4WD models) - removal and installation

Removal

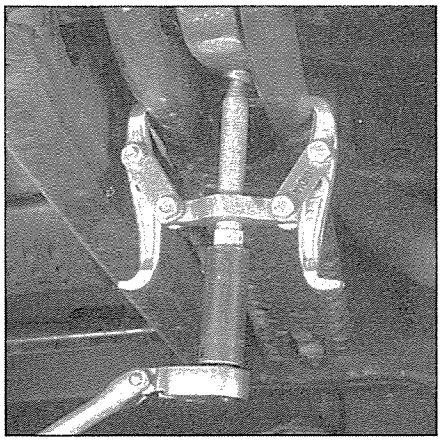
1 Put the vehicle in gear, apply the parking brake and break loose the driveaxle/hub nut with a socket and large breaker bar.
2 Loosen the wheel lug nuts, raise the front of the vehicle and support it securely on jackstands. Apply the parking brake. Remove the wheel. Remove the driveaxle/hub nut.
3 Unbolt the brake caliper, hang it out of the way with a piece of wire and remove the brake disc (see Chapter 9).
4 Disconnect the tie-rod end from the steering knuckle (see Section 17).
5 Support the lower control arm with a floor jack and detach the steering knuckle from the lower balljoint (see Section 4). **Warning:** *The jack must remain in this position throughout the entire procedure; the lower control arm is "loaded" by the torsion bar.*
6 Support the steering knuckle and separate it from the upper balljoint (see Section 4).
7 Using a puller, push the driveaxle out of the hub while withdrawing the steering knuckle and hub assembly.
8 If you're planning to replace the hub and bearing assembly or the knuckle, remove the hub and bearing assembly from the knuckle (see Section 9).
9 Inspect the seal on the rear side of the knuckle. If it's damaged or shows signs of deterioration, pry it out with a large screwdriver or prybar. Install a new seal by driving it in with a socket that has an outside diameter slightly smaller than the seal.

Installation

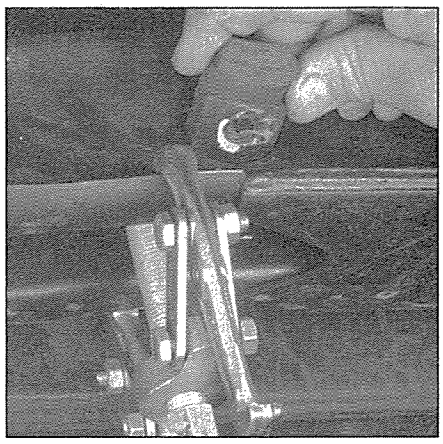
10 Installation is the reverse of the removal procedure. Be sure to lubricate the driveaxle splines with multi-purpose grease and tighten all of the fasteners to the torque listed in this Chapter's Specifications.



11.2 To ensure proper adjustment of the torsion bar upon reassembly, count the number of threads showing on the torsion bar adjuster bolt and mark the relationship of the bolt to the torsion bar adjuster nut as insurance



11.3 Install a small puller as shown, with the fingers hooked around the flange running along each side of the crossmember; make sure the puller bolt is centered on the dimple in the torsion bar adjuster arm; tighten the puller bolt until all tension is removed from the adjuster nut



11.4 With tension removed from the adjuster nut, remove the adjuster nut

11 Torsion bar (4WD models) - removal and installation

Refer to illustrations 11.2, 11.3, 11.4, 11.5, 11.6a, 11.6b, 11.7, 11.8 and 11.9

1 Loosen the front wheel lugs nuts, raise the vehicle and place it securely on jackstands. Remove the wheel.

2 Count the number of threads showing on the torsion bar adjuster bolt and mark the relationship of the bolt to the torsion bar adjuster nut **(see illustration)**.

3 In the torsion bar adjuster arm, there's a small dimple. Install a small puller with its bolt centered on this dimple **(see illustration)**.

4 Turn the puller bolt until all tension is removed from the torsion bar adjuster arm, then remove the torsion bar adjuster nut **(see illustration)**. Remove the puller.

5 Mark the relationship of the forward end of the torsion bar to the lower control arm **(see illustration)**.

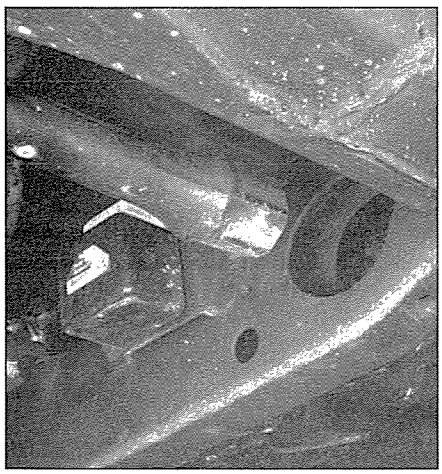
6 Push the torsion bar forward, through the lower control arm, until the rear end of the bar clears the crossmember **(see illustration)** and remove the torsion bar adjuster arm **(see illustration)**.

7 Pull the torsion bar down and to the rear as far as it will go. If the front end of the bar hangs up in the lower control arm, drive it out of the control arm with a brass drift **(see illustration)**.

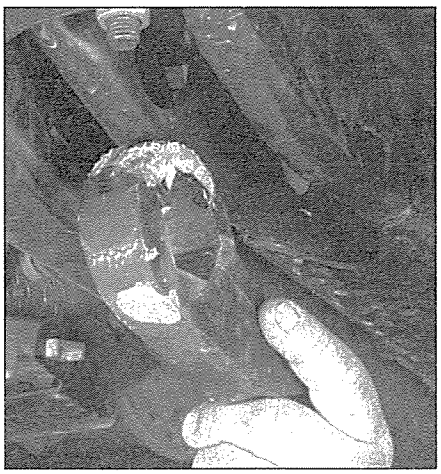
8 Installation is the reverse of removal. Be sure to clean out the hexagonal hole in the lower control arm and lube it with multi-purpose grease **(see illustration)** before inserting the torsion bar into the arm. Also apply some grease to the hex ends of the torsion bar, to the top of the adjuster arm and to the adjuster bolt. Make sure that the alignment marks you made on the torsion bar and the control arm line up. And make sure that the torsion bar adjuster bolt is tightened until the same number of threads are showing and the marks you made on the adjuster bolt and nut are lined up.

9 Measure the torsion arm-to-crossmember clearance after installation **(see illustra-**

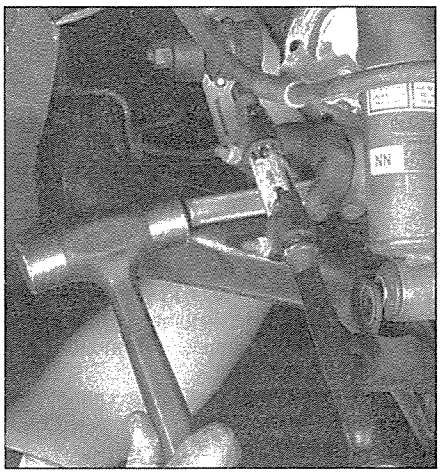
11.5 Mark the relationship of the torsion bar to the lower control arm as shown



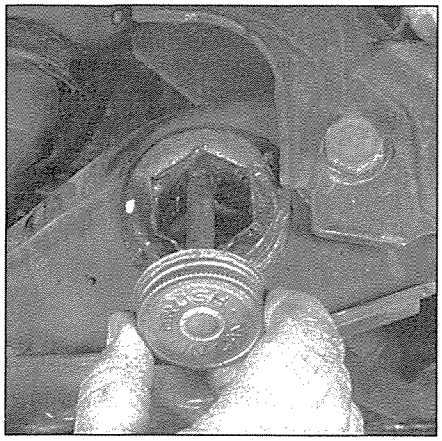
11.6a Slide the torsion bar forward through the lower control arm far enough to pull the rear end of the bar out of the crossmember . . .



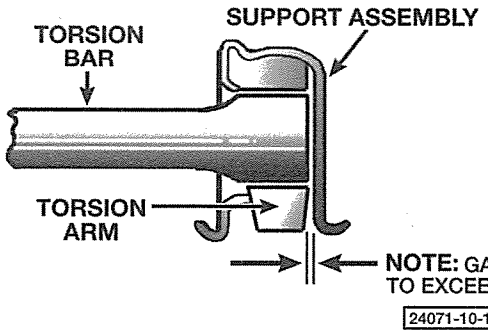
11.6b . . . and remove the torsion bar adjuster arm. Hold your hand under the arm as you slide out the torsion bar to prevent the arm from falling



11.7 If the torsion bar hangs up in the lower control arm, knock it out with a brass drift



11.8 Clean up any corrosion inside the hex hole in the control arm and lube it with multi-purpose grease before installing the torsion bar



11.9 The clearance measurement indicated here should be checked after torsion bar installation; it should not exceed 1/4-inch

tion) and adjust the torsion bar fore and aft as necessary to bring it within this clearance.

10 Install the wheel, remove the jackstands and lower the vehicle.

11 Tighten the wheel lug nuts to the torque listed in the Chapter 1 Specifications.

12 Measure the vehicle's ride height on each side, from equal points on the frame to the ground. If the side that has been worked on is higher or lower than the other side, turn the torsion bar adjusting screw accordingly until the vehicle sits level. This may take a few tries, and it's important to roll the vehicle back and forth and jounce the front end between adjustments, to settle the suspension and get an accurate reading.

12 Shock absorber (rear) - removal and installation

Refer to illustrations 12.2 and 12.3

1 Raise the rear of the vehicle and support securely on jackstands. Block the front wheels so the vehicle doesn't roll off the stands.

2 Remove the shock absorber upper mounting bolts from the frame **(see illustration)**.

3 Remove the lower mounting nut, washer and bolt from the anchor plate bracket **(see illustration)**.

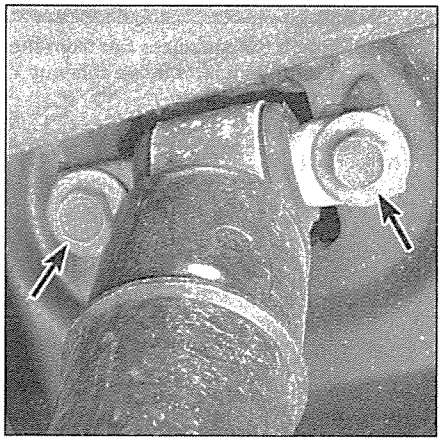
4 Remove the shock absorber.

5 Installation is the reverse of removal. Make sure you install the nuts and bolts facing in the proper direction. Tighten all fasteners to the torque listed in this Chapter's Specifications.

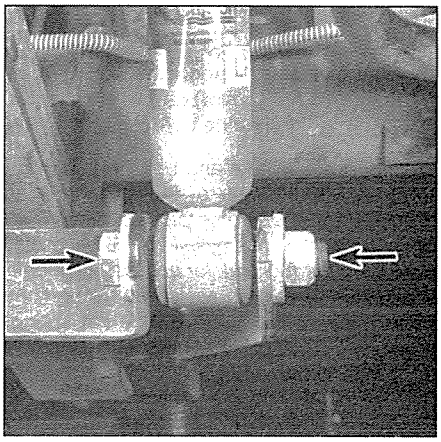
13 Leaf spring/shackle - removal and installation

Refer to illustrations 13.2, 13.5 and 13.7

1 Raise the rear of the vehicle and support



12.2 To detach the upper end of the shock absorber from the frame, remove these bolts (arrows)



12.3 To detach the lower end of the shock absorber from the anchor plate, remove this nut, washer and bolt (arrows)

it securely on jackstands. Block the front wheels to keep the vehicle from rolling off the stands. Support the axle with a floor jack and raise it slightly to relieve the tension on the leaf springs.

2 Remove the four U-bolt nuts and washers **(see illustration)**.

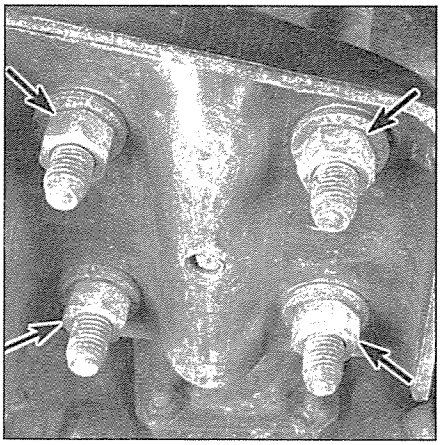
3 Remove the anchor plate.

4 Remove the U-bolts and spacer.

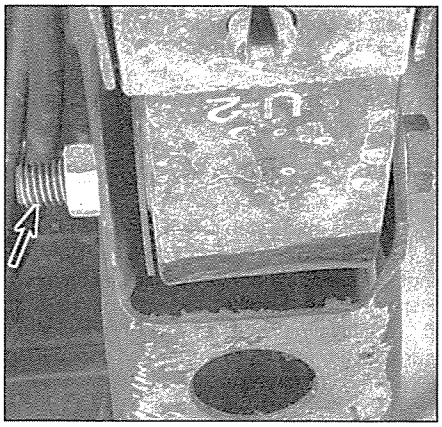
5 Remove the nut from the front spring-mount bolt **(see illustration)**.

6 Raise the axle slightly off the springs with the floor jack. Be sure the axle is stable. The axle must remain supported by the jack during the entire time the spring is removed from the vehicle. If this will be an extended period of time, it would be a good idea to support the axle with jackstands at this point.

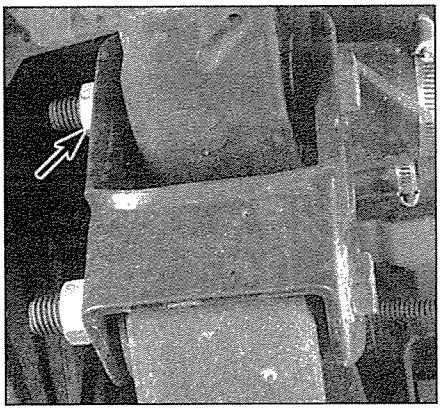
7 While an assistant supports the rear of the spring, remove the shackle-to-frame



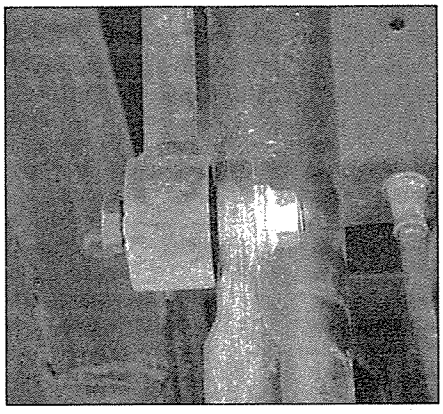
13.2 To detach the anchor plate, remove these four nuts from the U-bolts



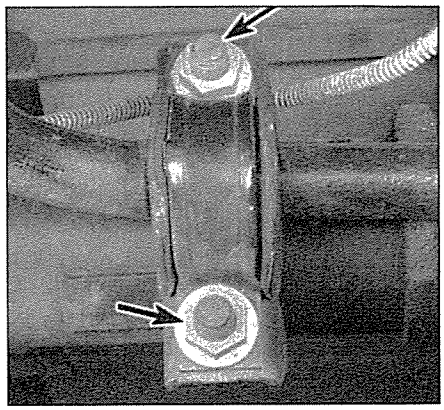
13.5 Remove the nut from the front leaf spring mounting bolt (arrow), but don't remove the bolt until the rear of the leaf spring has been detached and the leaf spring is supported



13.7 To detach the rear of the leaf spring, have an assistant support the spring, then remove this nut (arrow) and withdraw the shackle bolt



14.2 To detach the stabilizer bar from the lower end of the link, remove this nut and bolt



14.3 To detach the stabilizer bar from the rear axle, remove these nuts (arrows) from both pairs of U-bolts

bracket nut, washers and bolt **(see illustration)**. Lower the rear of the spring to the ground. **Note:** *On some pick-ups and four-door Blazers and Jimmys, it will be necessary to remove the fuel tank for access to the bolt.*

8 While having an assistant support the front of the spring, remove the front spring-mount bolt, then remove the spring assembly from the vehicle.

9 Installation is the reverse of removal. Gradually tighten the U-bolt nuts in a criss-cross pattern. Then tighten all the fasteners to the torque listed in this Chapter's Specifications.

10 If the bushings at the ends of the spring are worn or deteriorated, an automotive machine shop or dealer service department can press the old ones out and press new ones in.

14 Stabilizer bar (rear) - removal and installation

Refer to illustrations 14.2 and 14.3

1 Raise the rear of the vehicle and support it securely on jackstands. Block the front wheels to keep the vehicle from rolling off the stands.

2 Remove the lower nuts, washers and bolts from the stabilizer bar-to-frame bracket links **(see illustration)**.

3 Remove the nuts from the U-bolts and remove the stabilizer bar clamps **(see illustration)**.

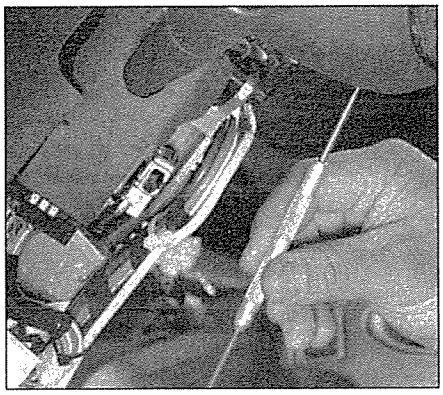
4 Remove the stabilizer bar assembly.

5 Inspect the stabilizer bar and link bushings for cracks, tears and other deterioration. Replace as necessary.

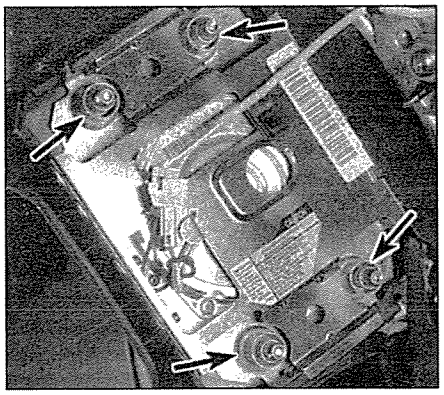
6 Installation is the reverse of removal. Be sure to tighten all fasteners to the torque listed in this Chapter's Specifications.

15 Track bar (ZR2 models) - removal and installation

1 Raise the rear of the vehicle and support it securely on jackstands. Block the front wheels to keep the vehicle from rolling off the stands.



16.4a To detach the airbag module from the steering wheel on 1995 models, rotate the wheel 90-degrees, insert a hard and thin object - such as a scribe - and push in firmly against each of the four ball-lock fasteners to unlock the airbag module from the wheel



16.4b Unplug the yellow electrical connector from the back of the airbag module; the arrows point at the four ball-lock type fasteners used on 1995 models

2 Support the rear axle at its normal ride height position with a floor jack.

3 Remove the nut, washer and bolt and detach the upper end of the track bar from the right frame rail bracket.

4 Remove the nut, washer and bolt and detach the lower end of the track bar from the left axle bracket.

5 Remove the track bar.

6 Installation is the reverse of removal. Be sure to tighten both nuts to the torque listed in this Chapter's Specifications.

16 Steering wheel - removal and installation

Refer to illustrations 16.4a, 16.4b, 16.5, 16.7 and 16.8

Warning: *Anytime you are working in the vicinity of airbag wiring or components, disable the SIR (airbag) system (see Chapter 12).*

1 Disconnect both cables from the battery (see Chapter 5). **Caution:** *On models equipped with a Delco Loc II anti-theft audio system, be sure the lockout feature is turned off before performing any procedure which requires disconnecting the battery.*

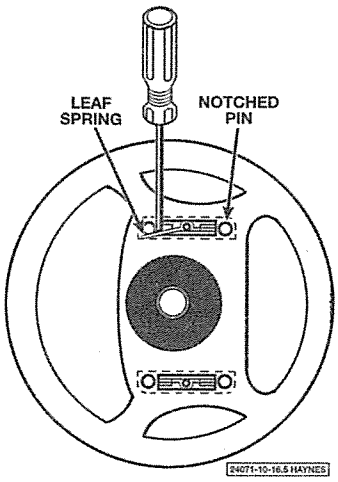
2 On 1994 models, simply pry off the horn cap.

3 On airbag-equipped models, refer to Chapter 12 and disable the airbag system.

4 On 1995 models, turn the steering wheel 90-degrees to gain access to the holes in the backside (the side facing the dash) of the steering wheel. Insert a thin hard tool such as a ball-point pen or a scribe into the hole for each of the four spring-loaded fasteners **(see illustrations)**. Push in firmly against the head of each fastener with the tool and pull on the airbag module simultaneously with the other hand.

5 On 1996 and later models, turn the steering wheel 90-degrees to gain access to the holes in the backside (the side facing the dash) of the steering wheel. Insert a screwdriver into the hole for each of the four spring clips **(see illustration)** and push the spring aside to release the pin. There are four pins and four springs.

6 Push in and twist the horn contact plunger to release and remove it, then remove the screws securing the horn contact plate. On airbag-equipped models, unplug the yellow electrical connector from the module and set



16.5 To detach the airbag module from the steering wheel on 1996 and later models, rotate the wheel 90-degrees, insert a screwdriver into each of the four holes in the backside of the steering wheel and pry each leaf spring aside to release it from its notched pin (there are four of them)

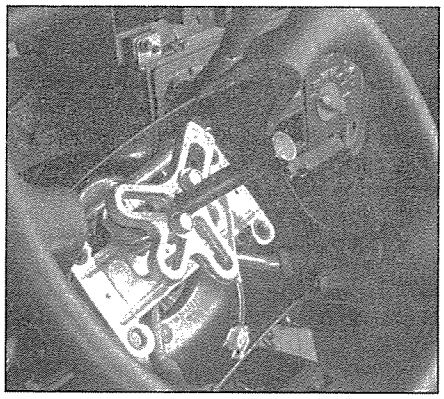
the module aside, with the airbag side of the module facing UP. **Warning:** *DO NOT lay the module down with the airbag side facing down. If it goes off, you could be injured!*

7 Remove the steering wheel retaining nut and mark the position of the steering wheel to the shaft, if marks don't already exist or don't line up **(see illustration)**. **Note:** *On later models with optional control switches mounted in the steering wheel, disconnect the electrical connectors before removing the wheel.*

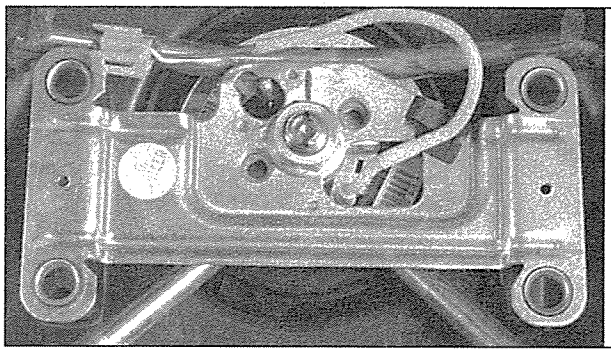
8 Use a puller to detach the steering wheel from the shaft **(see illustration)**. Don't hammer on the shaft to dislodge the wheel.

9 To install the wheel, align the mark on the steering wheel hub with the mark on the shaft and slide the wheel onto the shaft. Install the nut and tighten it to the torque listed in this Chapter's Specifications.

10 Installation is otherwise the reverse of removal.



16.8 Remove the steering wheel with a steering wheel puller - do not hammer on the steering shaft



16.7 Mark the relationship of the steering wheel to the steering shaft before removing the wheel

17 Steering linkage - inspection, removal and installation

Inspection

1 The steering linkage **(see illustrations 1.1a and 1.1b)** connects the steering gear to the front wheels and keeps the wheels in proper relation to each other. The linkage consists of the Pitman arm, the idler arm, the relay rod, two adjustable tie-rods and a steering damper. The Pitman arm, which is fastened to the steering gear shaft, moves the relay rod back-and-forth. The relay rod is supported on the other end by a frame-mounted idler arm. The back-and-forth motion of the relay rod is transmitted to the steering knuckles through a pair of tie-rod assemblies. Each tie-rod is made up of an inner and outer tie-rod end, a threaded adjuster tube and two clamps.

2 Set the wheels in the straight-ahead position and lock the steering wheel.

3 Raise one side of the vehicle until the tire is approximately 1-inch off the ground.

4 Mount a dial indicator with the needle resting on the outside edge of the wheel. Grasp the front and rear of the tire and, using light pressure, wiggle the wheel back-and-forth and note the dial indicator reading. The gauge reading should be less than 0.108-inch. If the play in the steering system is more than specified, inspect each steering linkage pivot point and ball stud for looseness and replace parts, if necessary.

5 Raise the vehicle and support it on jackstands. Push up, then pull down on the relay rod end of the idler arm, exerting a force of approximately 25 pounds each way. Measure the total distance the end of the arm travels. If the play is greater than 1/4-inch, replace the idler arm.

6 Check for torn ball stud boots, frozen joints and bent or damaged linkage components.

Removal and installation

Tie-rod

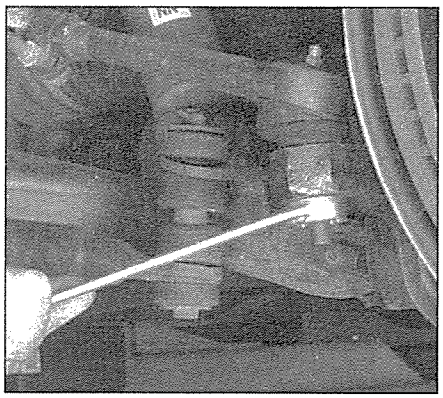
Refer to illustrations 17.8, 17.9, 17.11 and 17.15

Note: *This procedure covers replacing the tie-rod ends as well as the entire tie-rod. If you'll only be replacing a tie-rod end, ignore the Steps that don't apply.*

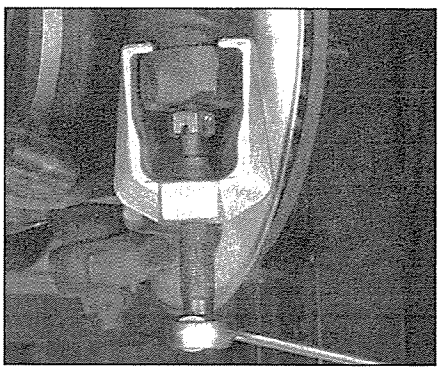
7 Loosen the wheel lug nuts, raise the vehicle and support it securely on jackstands. Apply the parking brake. Remove the wheel.

8 Remove the cotter pin and loosen, but do not remove, the castellated nut(s) from the ball stud(s) **(see illustration)**. If only the outer tie-rod end will be replaced, only loosen the outer nut. If only the inner tie-rod end will be replaced, only loosen the inner nut. If the entire tie-rod will be replaced, loosen both nuts.

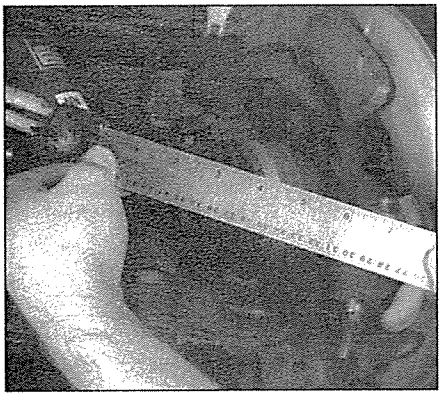
9 If the outer tie-rod end or the entire tie-rod will be replaced, use a two-jaw puller to separate the tie-rod end from the steering knuckle **(see illustration)**. Remove the castellated nut and pull the tie-rod end from the knuckle.



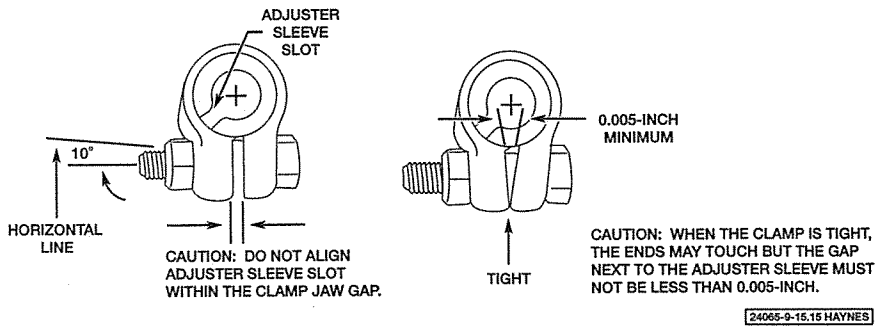
17.8 Remove the cotter pin, then loosen - but don't yet remove - the castellated nut on the tie-rod end ballstud



17.9 Install a small puller on the tie-rod end ballstud and separate the ballstud from the steering knuckle - leaving the nut in place will prevent the parts from separating violently



17.11 Measure the distance from the end of the adjuster tube to the center of the ballstud and record your measurement before loosening the adjuster tube clamp and unscrewing the tie-rod end


ADJUSTER SLEEVE SLOT
10°
HORIZONTAL LINE
CAUTION: DO NOT ALIGN ADJUSTER SLEEVE SLOT WITHIN THE CLAMP JAW GAP.
0.005-INCH MINIMUM
TIGHT
CAUTION: WHEN THE CLAMP IS TIGHT, THE ENDS MAY TOUCH BUT THE GAP NEXT TO THE ADJUSTER SLEEVE MUST NOT BE LESS THAN 0.005-INCH.
24065-9-15.15 HAYNES

17.15 Note these guidelines when installing the tie-rod ends

10 If the inner tie-rod end or the entire tie-rod will be replaced, separate the inner tie-rod end from the relay rod (see Steps 8 and 9).

11 If the inner or outer tie-rod end must be replaced, measure the distance from the end of the adjuster tube to the center of the ball stud and record it **(see illustration)**. Loosen the adjuster tube clamp bolts and unscrew the tie-rod end.

12 Lubricate the threaded portion of the tie-rod end with chassis grease. Screw the new tie-rod end into the adjuster tube and adjust the distance from the tube to the ball stud to the previously measured dimension. The number of threads showing on the inner and outer tie-rod ends should be equal within three threads. Don't tighten the clamp yet.

13 Connect the disconnected ball stud nut(s). Tighten the nut(s) to the torque listed in this Chapter's Specifications and install a new cotter pin. If the ball stud spins when attempting to tighten the nut, force it into the tapered hole with a large pair of pliers. If necessary, tighten the nut slightly to align a slot in the nut with the hole in the ball stud.

14 Insert the inner tie-rod end ball stud into the relay rod until it's seated. Install the nut and tighten it to the torque listed in this Chapter's Specifications.

15 Tighten the clamp nuts. The center of the bolt should be nearly horizontal and the adjuster tube slot must not line up with the gap in the clamps **(see illustration)**.

16 Install the wheel and lug nuts, lower the vehicle and tighten the lug nuts to the torque listed in the Chapter 1 Specifications. Drive the vehicle to an alignment shop to have the front end alignment checked and, if necessary, adjusted.

Idler arm

17 Raise the vehicle and support it securely on jackstands. Apply the parking brake.

18 Loosen but do not remove the idler arm-to-relay rod nut.

19 Separate the idler arm from the relay rod with a two jaw puller **(see illustration 17.9)**. Remove the nut.

20 Remove the idler arm-to-frame bolts.

21 To install the idler arm, position it on the frame and install the bolts, tightening them to the torque listed in this Chapter's Specifications.

22 Insert the idler arm ball stud into the relay rod and install the nut. Tighten the nut to the specified torque. If the ball stud spins when attempting to tighten the nut, force it into the tapered hole with a large pair of pliers.

Relay rod

23 Raise the vehicle and support it securely on jackstands. Apply the parking brake.

24 Separate the two inner tie-rod ends from the relay rod (see Step 10).

25 Separate the relay rod from the Pitman arm (see Steps 29 and 30).

26 Separate the relay rod from the idler arm (see Steps 18 and 19).

27 Installation is the reverse of the removal procedure. If the ball studs spin when attempting to tighten the nuts, force them into the tapered holes with a large pair of pliers. Be sure to tighten all of the nuts to the torque listed in this Chapter's Specifications.

Pitman arm

28 Raise the vehicle and support it securely on jackstands.

29 Remove the relay rod nut from the Pitman arm ball stud. Discard the nut - don't reuse it.

30 Using a puller, separate the relay rod from the Pitman arm ball stud.

31 Remove the steering gear (see Section 18).

32 Remove the Pitman arm nut and washer. Mark the Pitman arm and the steering gear shaft to ensure proper alignment at reassembly time.

33 Remove the Pitman arm with a Pitman arm puller or a two-jaw puller.

34 Inspect the ball stud threads for damage. Inspect the ball stud seals for excessive wear. Clean the threads on the ball stud.

35 Installation is the reverse of removal. Make sure the marks you made on the Pitman arm and Pitman shaft are aligned. **Note:** *If a clamp type Pitman arm is used, spread the arm just enough, with a wedge, to slip the arm onto the Pitman shaft. Don't spread the arm more than necessary to slip it over the shaft with hand pressure. Do not hammer the arm onto the shaft or you may damage the steering gear.*

Steering damper

36 Inspect the steering damper for fluid leakage. A slight film of fluid near the shaft seal is normal, but if there's excessive fluid present and it's obviously coming from the steering damper, replace the damper.

37 Inspect the steering damper bushing for excessive wear. If it's in bad shape, replace the damper.

38 To test the damper itself, disconnect it from the frame or axle end (see next step). Using as much travel as possible, extend and compress the damper. The resistance should be smooth and constant for each stroke. If any binding or unusual noises are present, replace the damper.

39 Remove the damper ballstud-to-relay rod cotter pin, then remove the nut. Separate the damper from the relay rod, using the technique shown in **illustration 17.9**.

40 Remove the steering damper mounting bolt and nut, then remove the damper.

41 Installation is the reverse of removal. Tighten all the fasteners securely.

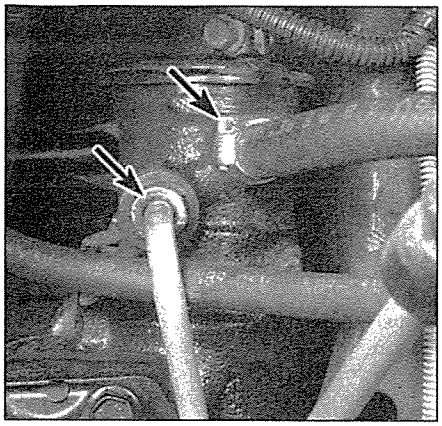
18 Steering gear - removal and installation

Removal

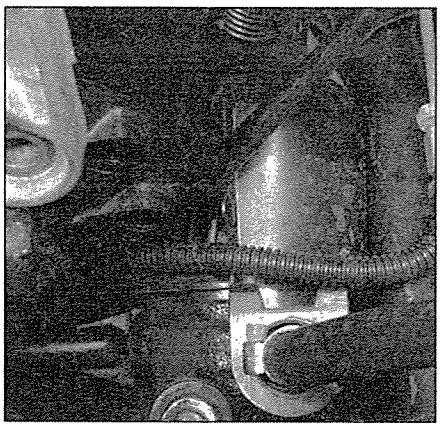
Refer to illustrations 18.2, 18.3a, 18.3b, 18.5, 18.6 and 18.7

Warning 1: *If equipped with an airbag, disable the airbag system before working in the vicinity of the steering wheel, instrument panel or any airbag system component. Failure to do so could cause accidental deployment of the airbag resulting in personal injury (see Chapter 12).*

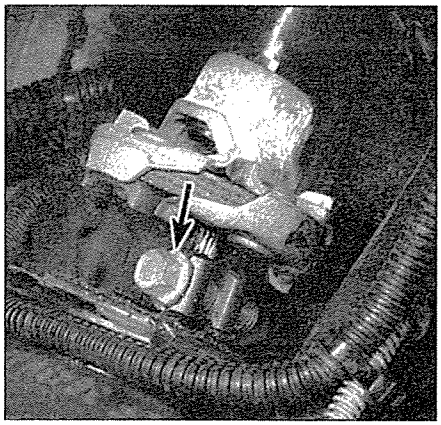
Warning 2: *On models equipped with an airbag, DO NOT allow the steering column shaft to rotate with the steering gear removed or damage to the airbag system could occur. As a method of preventing the shaft from turning, wrap the seat belt around the rim of the steering wheel and buckle the belt in place.*



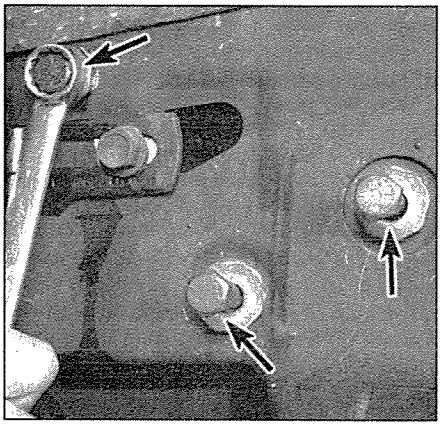
18.2 To disconnect the power steering fluid high-pressure line, unscrew this threaded fitting (lower arrow) with a flare-nut wrench; to disconnect the return line, loosen this hose clamp (upper arrow)



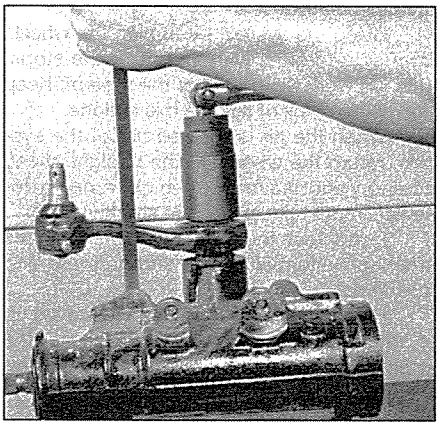
18.3a The intermediate shaft U-joint and pinch bolt are protected by a plastic shield; to remove the shield, pop the two halves apart with a screwdriver, then pull it out



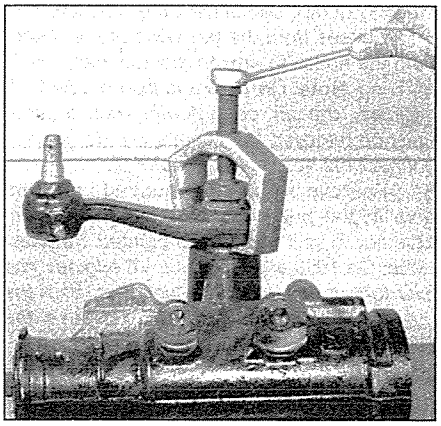
18.3b To detach the intermediate shaft from the steering gear shaft, remove this U-joint pinch bolt (arrow)



18.5 To remove the steering gear, remove these three bolts (arrows)



18.6 With the steering gear in a bench vise, use a prybar as shown to hold the Pitman arm and break loose the Pitman arm nut (don't remove the nut, just loosen it); be sure to mark the relationship of the Pitman arm to the steering gear shaft before pulling it off



18.7 Remove the Pitman arm with a Pitman arm puller. This specialized tool is available at most auto parts stores

1 Raise the front of the vehicle and support it securely on jackstands. Apply the parking brake.

2 Place a drain pan under the steering gear. Disconnect the power steering hose fittings **(see illustration)** and cap the ends to prevent excessive fluid loss and contamination.

3 Insert a screwdriver between the two halves of the U-joint plastic shield **(see illustration)** and pry them apart, then pull out the shield. Mark the relationship of the intermediate shaft lower universal joint to the steering gear input shaft. Remove the intermediate shaft lower pinch bolt **(see illustration)**.

4 Disconnect the Pitman arm from the relay rod (see Section 17).

5 Support the steering gear and remove the mounting bolts **(see illustration)**. Lower the unit, separate the intermediate shaft from the steering gear input shaft and remove the steering gear from the vehicle. **Warning:** *On models equipped with an airbag, DO NOT allow the steering column shaft to rotate with the steering gear removed or damage to the airbag system could occur. As a method of preventing the shaft from turning, wrap the seat belt around the rim of the steering wheel and buckle the belt in place.*

6 Mark the relationship of the Pitman arm to the shaft so it can be installed in the same position. Remove the Pitman arm nut and washer **(see illustration)**.

7 Remove the Pitman arm from the shaft with a special puller **(see illustration)**.

Installation

8 Slide the Pitman arm onto the shaft. Make sure the marks are aligned. Install the washer and nut and tighten the nut to the torque listed in this Chapter's Specifications.

9 Raise the steering gear and Pitman arm into position and connect the intermediate shaft, aligning the marks.

10 Install the mounting bolts and washers and tighten them to the torque listed in this Chapter's Specifications.

11 Install the lower intermediate shaft pinch bolt and tighten it to the torque listed in this Chapter's Specifications. Install the plastic shield.

12 Connect the power steering hose fittings to the steering gear and fill the power steering pump reservoir with the recommended fluid (see Chapter 1).

13 Lower the vehicle and bleed the steering system (see Section 20).

19 Power steering pump - removal and installation

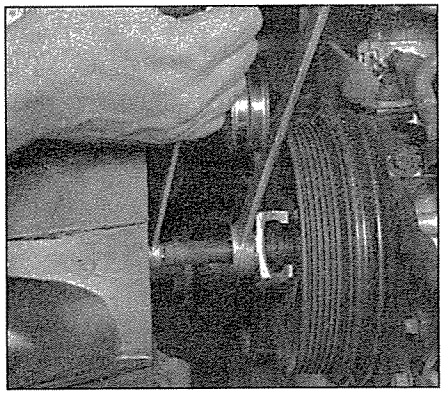
Removal

Refer to illustration 19.3

1 Disconnect the cable from the negative terminal of the battery. **Caution:** *On models equipped with a Delco Loc II anti-theft audio system, be sure the lockout feature is turned off before performing any procedure which requires disconnecting the battery.*

2 Remove the upper fan shroud (see Chapter 3). Remove the serpentine drivebelt (see Chapter 1).

3 Using a special power steering pump pulley remover, remove the pulley from the



19.3 You'll need a special puller to remove the power steering pump pulley

pump **(see illustration)**.

4 Position a drain pan under the power steering pump. Disconnect the pressure and return hoses from the backside of the pump. Plug the hoses to prevent contaminants from entering. **Note:** *On 1999 and later model 2.2L engines, the air conditioning compressor must be removed for access, but do not disconnect the hoses (see Chapter 3).*

5 Remove the pump mounting fasteners and lift the pump from the vehicle, taking care not to spill fluid on the painted surfaces. **Note:** *On 1999 and later 4.3L V6 engines, the filler tube bracket must be unbolted from the air conditioning compressor. Remove the filler tube before removing the pump.*

Installation

Refer to illustration 19.8

6 Position the pump in the mounting bracket and install the bolts and nut. Tighten the fasteners securely.

7 Connect the hoses to the pump. Tighten the fittings securely.

8 Press the pulley onto the shaft using a special pulley installer tool. An alternative tool can be fabricated from a long bolt, nut, washer and a socket of the same diameter as the pulley hub **(see illustration)**. Push the pulley onto the shaft until the front of the hub is flush with the shaft, but no further.

9 Install the drivebelt.

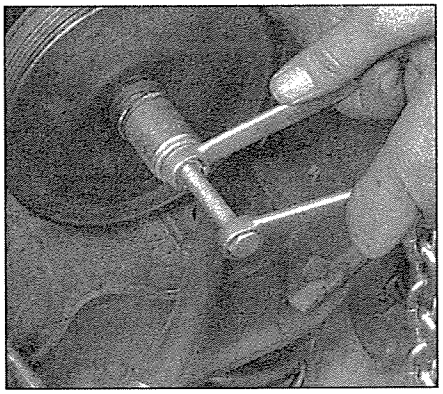
10 Fill the power steering reservoir with the recommended fluid (see Chapter 1) and bleed the system following the procedure described in the next Section.

20 Power steering system - bleeding

1 Following any operation in which the power steering fluid lines have
been disconnected, the power steering system must be bled to remove all air and obtain proper steering performance.

2 With the front wheels in the straight ahead position, check the power steering fluid level and, if low, add fluid until it reaches the Cold mark on the dipstick.

3 Start the engine and allow it to run at fast idle. Recheck the fluid level and add



19.8 To install the pulley on the shaft, use a long bolt with the same thread pitch as the internal threads of the power steering pump shaft, a nut, washer and socket that's the same diameter as the pulley hub

more if necessary to reach the Cold mark on the dipstick.

4 Bleed the system by turning the wheels from side-to-side, without hitting the stops. This will work the air out of the system. Keep the reservoir full of fluid as this is done.

5 When the air is worked out of the system, return the wheels to the straight ahead position and leave the vehicle running for several more minutes before shutting it off.

6 Road test the vehicle to be sure the steering system is functioning normally and noise free.

7 Recheck the fluid level to be sure it's up to the Hot mark on the dipstick while the engine is at normal operating temperature. Add fluid if necessary (see Chapter 1).

21 Wheels and tires - general information

All vehicles covered by this manual are equipped with metric-size fiberglass or steel belted radial tires. Use of other size or type of tires may affect the ride and handling of the vehicle. Don't mix different types of tires, such as radials and bias belted, on the same vehicle as handling may be seriously affected. It's recommended that tires be replaced in pairs on the same axle, but if only one tire is being replaced, be sure it's the same size, structure and tread design as the other.

Because tire pressure has a substantial effect on handling and wear, the pressure on all tires should be checked at least once a month or before any extended trips (see Chapter 1).

Wheels must be replaced if they're bent, dented, leak air, have elongated bolt holes, are heavily rusted, out of vertical symmetry or if the lug nuts won't stay tight. Wheel repairs that use welding or peening are not recommended.

Tire and wheel balance is important to the overall handling, braking and performance of the vehicle. Unbalanced wheels can adversely affect handling and ride characteristics as well as tire life. Whenever a tire is installed on a wheel, the tire and wheel should be balanced by a shop with the proper equipment.

22 Front end alignment - general information

Refer to illustration 22.1

A front end alignment refers to the adjustments made to the front wheels so they're in proper angular relationship to the suspension and the ground. Front wheels that are out of proper alignment not only affect steering control, but also increase tire wear.

Getting the proper front wheel alignment is a very exacting process, one in which complicated and expensive machines are necessary to perform the job properly. Because of this, you should have a technician with the proper equipment perform these tasks. We will, however, use this space to give you a basic idea of what is involved with front end alignment so you can better understand the process and deal intelligently with the shop that does the work.

Toe-in is the turning in of the front wheels. The purpose of a toe specification is to ensure parallel rolling of the front wheels. In a vehicle with zero toe-in, the distance between the front edges of the wheels will be the same as the distance between the rear edges of the wheels. The actual amount of toe-in is normally only a fraction of an inch. Toe-in adjustment is controlled by the tie-rod end position on the inner tie-rod. Incorrect toe-in will cause the tires to wear improperly by making them scrub against the road surface. Toe-in can be adjusted by turning the adjusting sleeves on the tie-rods equal amounts in the same direction.

Camber is the tilting of the front wheels from the vertical when viewed from the front of the vehicle. When the wheels tilt out at the top, the camber is said to be positive (+). When the wheels tilt in at the top the camber is negative (-). The amount of tilt is measured in degrees from the vertical and this measurement is called the camber angle. This angle affects the amount of tire tread which contacts the road and compensates for changes in the suspension geometry when the vehicle is cornering or traveling over an undulating surface. Camber is adjusted by placing an equal number of shims between the upper control arm pivot shaft and the frame at each bolt location (2WD models). On 4WD models, camber is adjusted by rotating cam-shaped adjusters at the front and rear of the upper control arm.

Caster is the tilting of the top of the front steering axis from the vertical. A tilt toward the rear is positive caster and a tilt toward the front is negative caster. Caster is adjusted by placing unequal numbers of shims between the upper control arm pivot shaft and the frame at each bolt location (2WD models). On 4WD models, caster is adjusted by rotating cam-shaped adjusters at the front and rear of the upper control arm.